FIVE NEW SPECIES AND THREE NEW RECORDS OF *BURMEISTERA* (CAMPANULACEAE-LOBELIOIDEAE) FROM COLOMBIA

Cinco especies nuevas y tres nuevos registros de *Burmeistera* (Campanulaceae-Lobelioideae) para Colombia

Javier Garzón Venegas
Favio González
Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Apartado 7495, Bogotá, D.C. Colombia. fagonzalezg@unal.edu.co: Corresponding author.

ABSTRACT
Five new species of Colombian *Burmeistera* are described and illustrated and their relationships with other species from Colombia, Central America, Venezuela, and Ecuador are discussed. Three of the newly described species are from the Western Cordillera, one from the Central Cordillera and one is restricted to the northern part of the Eastern Cordillera. Along with the descriptions of these new species, we record the presence of *B. formosa, B. smaragdi,* and *B. venezuelensis* for the first time in Colombia. Some guidelines to collect *Burmeistera* specimens are also included to preserve distinctive traits that are often lost once they have been pressed and dried.

Key words. Andean Flora, Colombian Lobelioideae, Andean Endemics, Flora of Colombia.

RESUMEN
Se describen e ilustran cinco nuevas especies de *Burmeistera* de Colombia, y se discuten sus afinidades con respecto a otras especies de Colombia, de Centro América, de Venezuela y de Ecuador. Tres de las nuevas especies crecen en la Cordillera Occidental, una crece en la Cordillera Central, en tanto que la quinta especie está restringida a la parte norte de la Cordillera Oriental de Colombia. Junto con las descripciones de estas nuevas especies, reportamos por primera vez la presencia de *B. formosa, B. smaragdi* y *B. venezuelensis* en Colombia. Se incluyen, además, algunas recomendaciones para colectar especímenes de *Burmeistera*, ya que durante el proceso de prensado y secado, éstos pierden muchos rasgos distintivos en campo.

Palabras clave. Endemismo en los Andes, Flora Andina, Flora de Colombia, Lobelioideae de Colombia.

INTRODUCTION

The neotropical *Burmeistera* is the fourth largest genus of the Lobelioideae (Campanulaceae) with ca. 117 species. Species of this genus are terrestrial to epiphytic herbs, subshrubs or shrubs that grow in the understory of wet forest from Honduras to southern Peru. About 60 species grow in cloud forests of Colombia, between 1000–3000 m in elevation, and most of them have extremely narrow distributions.

The description of the genus by the Colombian botanist J. J. Triana (1854) was followed by contributions by Karsten & Triana (1856),

Zahlbruckner (1906, 1915), Gleason (1925), Wimmer (1931, 1932, 1943, 1953, 1968), McVaugh (1949, 1965), Nash (1976), Wilbur (1976a, 1976b, 1981), Lozano and Galeano (1986), Luteyn (1986), Stein (1987), Jeppesen (1981), Lammers (1998, 2002), and Lammers and Maas (1998). Additionally, Wimmer (1931, 1932, 1943, 1953, 1968) proposed two infrageneric groups, *Barbatae* and *Imberbes*, based on the presence or absence of a massive tuft of large trichomes in the apex of the ventral anthers, respectively.

During the ongoing taxonomic revision of the genus *Burmeistera* in Colombia, we have increased the total number of species for the genus to 117 by describing five new species (Garzón-Venegas, Vélez et al. in press, Garzón-Venegas, Luteyn et al. in press; Garzón-Venegas, González & Vélez-Puerta, in press), although seven species previously recognized by Wimmer (1931, 1932, 1943, 1953, 1968) are being reduced to the synonymy. Here we describe five additional species, four from the Western and Central cordilleras and one from the Eastern Cordillera. As in our previous work, the species here described are represented by at least four specimens, and exhibit particular combinations of characters that, together with the geographic distributions, led us to propose them as new species.

Burmeistera betancurii Garzón & F. González, **sp. nov.** TYPE: COLOMBIA. **Antioquia**: Amalfi, vereda "Guayabito", 6°48'48" North, 75°05'38" West, 1600-1800 m, 30 Jul 1999 (fl, fr), *D. Tuberquia, D. Rodríguez, L. A. Orrego 882* (holotype: COL; isotypes: JAUM). (Fig. 1A)

Scandent shrubs to 3 m high, with white latex, glabrous. Stems woody, slightly grooved, terete, glabrous, green, often suffused with purple, slightly branched; internodes 1.5-3 cm long. Leaves distichous; petiole 0.8-1.2 cm long, green, occasionally suffused with purple, glabrous; proximal and distal blades of approximately the same shape and size, ovate-lanceolate, (9-)12-14(-16) x 2-3.5 cm, fleshy, the base slightly asymmetric, rounded, the apex acute, the margins slightly serrulate, with ten to thirteen teeth on each side, teeth of one-size class, the adaxial surface bright green, lustrous, glabrous, the abaxial surface pale green, glabrous, the venation semi-craspedodromous, with seven to nine pairs of secondary veins, irregularly spaced, decurrent to mid-vein, higher order veins slightly inconspicuous, submarginal vein absent. Flowers solitary in the axils of upper leaves; peduncles pink to reddish, glabrous, 5-8 cm long at anthesis, ebracteate; hypanthium obconic, 9-11 mm long, 5-6 mm in diameter, glabrous; calyx lobes shortly triangular, 1.5-2.5 x 1.5-2.5 mm, erect, with the margins entire, sinus between the lobes 3-4 mm wide; corolla straight at anthesis, ca. 3.8-4.2 cm long, glabrous, green to green suffused with maroon, tube slightly swollen at base and distally, ca. 2 cm long, 4-6 mm in diameter, lobes unequal, narrowly triangular-falcate, forming an obtuse angle with respect to the tube, the apex acute, the dorsal lobes 18-25 x 4-6 mm, the lateral lobes 13-15 x 4-5 mm, the ventral lobe 8-10 x 4 mm; androecium exserted (by ca. 2 cm) between the dorsal lobes, the filament tube curved, to 3.2 cm long, apically sparsely pubescent, the anther tube curved-cylindrical, to 4 mm in diameter, puberulous, the dorsal and lateral anthers 7-9 mm long, the ventral anthers to 6 mm long, sparsely pubescent with an apical tuft of white woolly trichomes to 5 mm long; stigma bilobed. Berries ovoid, 1.5-2.5 x 1-1.5 cm (*in siccus*), fleshy, patent to erect, green suffused with pink to totally pink, glabrous, calyx lobes persistent, triangular; seeds ovoid, 1-1.2 x ca. 0.2 mm.

Etymology: This species is named in honor of the Colombian botanist Julio Betancur (b. 1960), who has greatly contributed to the knowledge of the flora of Colombia and to the training of a new generation of plant systematists in our country.

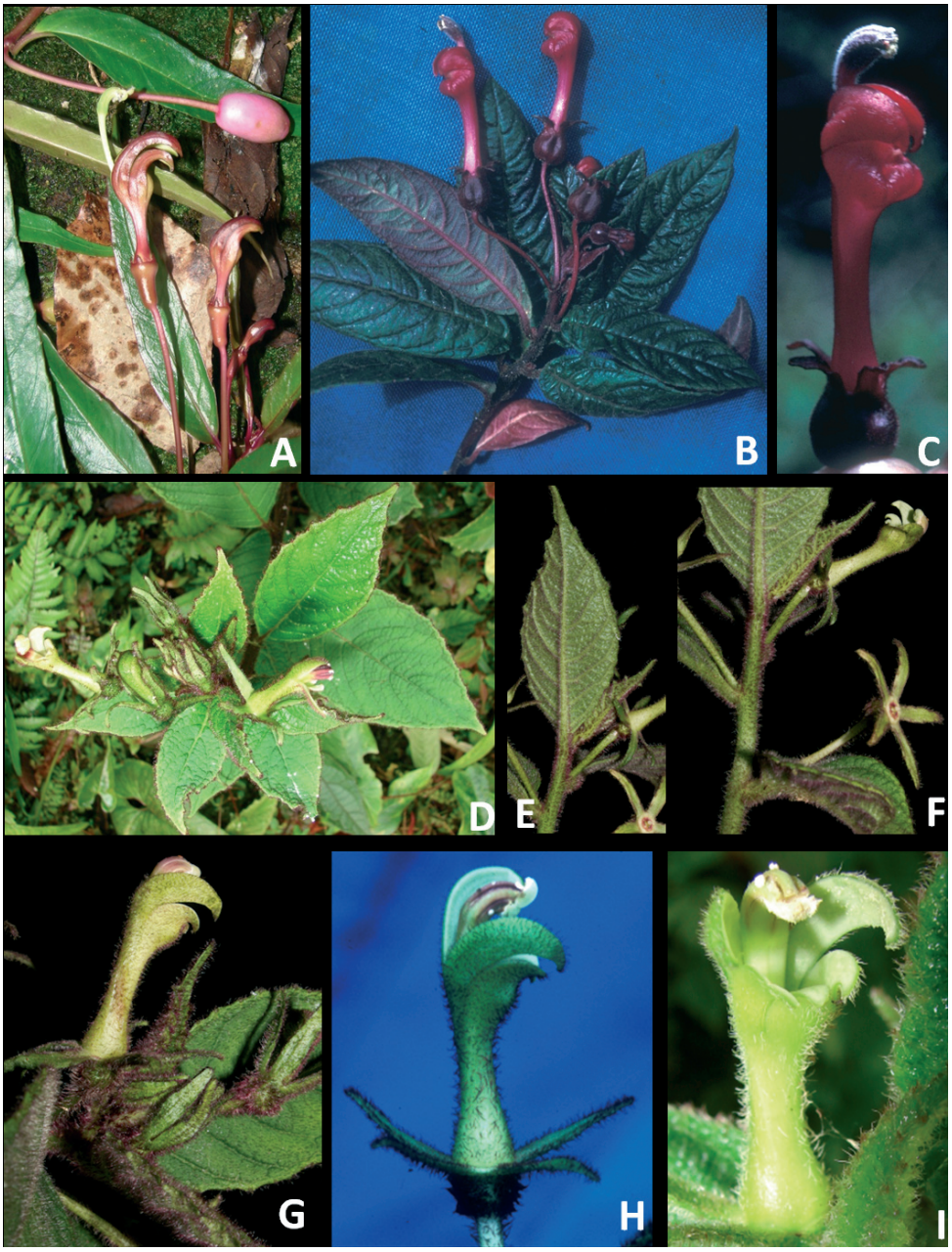

Figure 1. A. ***Burmeistera betancurii*** Garzón & F. González (Photo J. L. Toro). Branch with flowers and a berry. **B-C**. ***B. fuchsioides*** Garzón & F. González (*Luteyn 11804*). **B**. Branch with an anthetic (left) and a preanthetic flower. **C.** Detail of a flower in anthesis. **D-I**. ***B. nigropilosa*** J. L. Luteyn ex Garzón & F. González. **D**. Flowering specimen, from above. **E**. Leaf, lower side. **F**. Flower, side view, and young berry. **G-H**. Flower in early (**G**) and late (**H**) anthesis, side views. **I.** Anthetic flower, ventral view. (**D-G, I**, *P. Pedraza-Peñalosa et al. 2176*; photos J. Vélez; **H**, *J. L. Luteyn 11700*).

Distribution, ecology and phenology: *Burmeistera betancurii* has been collected only in a narrow area of the Central Cordillera of Colombia, located in the northeastern portion of the department of Antioquia. It grows in the understory stratum of subandean wet forests, between 800-1800 m in altitude. The area is highly altered due to agriculture, livestock ranching and mining, which makes this species extremely threatened. Fertile collections have been made in January, March, July, August and October.

Taxonomic notes: This species belongs to sect. *Barbatae* (sensu Wimmer, 1932, 1943). It is easily distinguished from its congeners by the narrowly ovate-lanceolate leaves, the long obconic hypanthia, the very short triangular calyx lobes separated by wide (3-4 mm wide) sinuses, and the very long corolla lobes (the dorsal lobes 18-25 mm, the lateral lobes 13-15 mm, the ventral lobe 8-10 mm). In Table 1 we compare *Burmeistera betancurii* with five closely related species, all of which share with the new species the long and narrow leaf form.

Table 1. Comparative traits of *Burmeistera betancurii* and five closely related species.

Traits	*B. betancurii,* sp. nov.	*B. darienensis* Wilbur	*B. huacamayensis* Jeppesen	*B. longifolia* Gleason	*B. truncata* A. Zahlbr.	*B. zurquiensis* Wilbur
Indument of lower surface of leaf blade	glabrous	glabrous	glabrous	pubescent	glabrous	glabrous
Length of petiole	0.8-1.2 cm	1-2.2 cm	0.4-0.5 cm	ca. 0.5 cm	0.8-1.5 cm	(5)7-10(13) cm
Number of secondary veins	seven to nine	twelve to fourtheen	twelve to sixteen	six to seven	twelve to thirteen	eight to ten
Length of peduncle	5-8 cm	3-5 cm	6-7 cm	unknown	5-6 cm	2-5 cm
Length of hypanthium	9-11 mm	7 mm	5-6 mm	ca. 7.5 mm	7-8 mm	5-8 mm
Shape and length of calyx lobes	triangular, 1.5-2.5 mm	ovate to oblong, 2-3 mm	linear, 4-5 mm	oblong-triangular 3.5 mm	linear-triangular, 8-15 mm	lanceolate, (6)8-12 mm
Sinuses between the calyx lobes	3-4 mm wide	≤ 1 mm wide	2-4 mm wide	unknown	to 1 mm wide	1-2 mm wide
Color of the corolla	green to green suffused with maroon	dark red	green with violet	unknown	green	green to green suffused with maroon
Length of the corolla tube	2 cm	1-1.2 cm	2.3 cm	1.4-2 cm	0.7-0.8 cm	2-2.5 cm
Length of dorsal/lateral/ ventral corolla lobes	18-25/ 13-15/ 8-10 mm	20-22/ 12-14/ ca. 10 mm	ca. 14/ ca. 9/ ca. 9 mm	ca. 13/ ca. 8/ ca. 8 mm	ca. 16/ ca. 8/ 7-8 mm	15-18/ 8-11/ 6-8 mm
Length of androecial portion exserted	ca. 2 cm	ca. 2 cm	ca. 1.2 cm	unknown	ca. 2.4 cm	unknown
Ventral anthers	barbate	barbate	barbate	barbate	not barbate	barbate
Shape of berry	ovoid	subglobose	subglobose	unknown	ovoid	globose
Geographic range	Central Cordillera (Colombia), NE of the department of Antioquia, between 800 and 1800 m.	Darien Province (Panama), between 830 and 1500 m.	Southern slopes of the Cordillera de Huacamayos, Napo-Pastaza provinces (Ecuador).	Northern slopes of the Western Cordillera (Colombia), S of the department of Córdoba, between 2400 and 2700 m.	Western slopes of the Andes of Ecuador, province of Pichincha between 1500 and 2500 m.	Heredia Province (Costa Rica), SE of Volcán Barba from Cerro Chompipe to Cerro Zurqui between 1700 and 2000 m.

Additional specimens examined: COLOMBIA. **Antioquia:** Amalfi, vereda Guayabito, finca Costa Rica, 1700-1800 m, 8 Ene 2005 (fl), *W. Ariza et al.1059* (JAUM); Amalfi, vereda La Viborita, alrededores de la mina de asbesto, 6°55' North, 75°05' West, 1430-1480 m, 6 Mar 2007 (fl, fr), *H. David et al.* 1543 (HUA); Anorí, vereda "Puerto Rico", 7°08'20" North, 75°08'20" West, 800-900 m, 19 Ago 1999 (fl), *D. Tuberquia et al. 1014* (JAUM); Amalfi, vereda "Las Ánimas", 6°56'2" North, 75"00'32" West, 1500-1600 m, 22 Oct 1999 (fl, fr), *D. Tuberquia & M. López 1395* (JAUM).

Burmeistera fuchsioides Garzón & F. González, **sp. nov.** TYPE: COLOMBIA. **Antioquia**: Jardín, vereda Ventanas, Jardín-Ventanas-Riosucio road, ca. 19.3 km SSE of Jardín, at border with Caldas, 2830 m, ca. 5°40' North, 75°47' West, 4 May 1989 (fl, fr), *J. L. Luteyn & O. Escobar 12753* (holotype: HUA; isotypes: JAUM, NY). (Fig. 1B-C)

Terrestrial herbs to 50 cm high, erect, with little white latex. Stems slightly woody, terete, pubescent, green, often suffused with purple, slightly branched; internodes 1.5-3 (-5) cm long. Leaves spirally arranged; petiole (0.5-) 1.5-4 cm long, green, occasionally suffused with purple, or completely maroon, densely pubescent; proximal and distal blades of approximately the same shape and size, ovate to elliptic, (4-) 6-11 x (2-) 3-4 (-5) cm, fleshy, the base often slightly asymmetric, cuneate to decurrent, the apex acute, occasionally shortly acuminate, the margins subentire to slightly serrulate, with 15-30 teeth on each side, teeth of two-size classes, each tooth with a distal callosity, the adaxial surface bright green, pubescent, the abaxial surface pale green suffused with purple, densely pubescent, the venation semicraspedodromous, with eight to ten pairs of secondary veins, irregularly spaced, excurrent to mid-vein, higher order veins reticulated, submarginal vein absent. Flowers solitary in the axils of upper leaves; peduncle purple, sparsely to densely pubescent, (3-) 4-7 (-8) cm long at anthesis, with two club-like bracts, 2-3 mm long each; hypanthium subglobose, 6-9 mm long, 5-8 mm in diameter, densely pubescent; calyx lobes liguliform, (3-) 5-9 x 2-4 mm, patent to reflexed, with the margins subentire; corolla straight at anthesis, 2.8-3.2 cm long, sparsely pubescent, dark pink to red outside, tube cylindrical, 1.5-1.9 cm long, 2-4 mm in diameter throughout its length, lobes unequal, broadly triangular-falcate, imbricate, forming an obtuse angle with respect to the tube, the apex acute, the dorsal lobes 8-11 x 5-8 mm, the lateral lobes 4-6 x 4-5 mm, the ventral lobe 4-5 x 5-6 mm; androecium exserted by 0.8-1.4 cm between the dorsal lobes, the filament tube erect, to 3 cm long, apically sparsely pubescent, the anther tube obliquely cup-shaped, to 4 mm in diameter, puberulous, the dorsal and lateral anthers 5-7 mm long, the ventral anthers 3-4 mm long, sparsely pubescent with an apical tuft of white woolly trichomes to 0.5 mm long; stigma bilobed. Berries globose, 1.5-2.5 cm in diameter (*in siccus*), fleshy, patent, yellow to maroon, sparsely pubescent, calyx lobes persistent, liguliform, to 9 mm long; seeds ovoid, to 0.8 x 0.2 mm.

Etymology: The name refers to this species' resemblance to some Andean species of *Fuchsia* (Onagraceae) in the shape and color of foliage and flowers.

Distribution, ecology and phenology: *Burmeistera fuchsioides* is known from the type locality and nearby stations in the municipalities of Jardín (Antioquia) and Riosucio (Caldas), on the eastern slopes of the Cordillera Occidental. It grows in the understory stratum of cloud or montane rain forest forests between 2400-2900 m. Flowering and fruiting specimens were collected in April-July, and in October.

Taxonomic notes: *Burmeistera fuchsioides* belongs to sect. *Barbatae* (sensu Wimmer, 1932, 1943). It stands out from other species by the bracteate peduncles, the short and

involute corolla lobes (Fig. 1B, C), and the yellow to maroon berries. In Table 2 we compare *B. fuchsioides* with three other species with similar shape and size of leaves, and size of the corolla.

Additional specimens examined: COLOMBIA. **Antioquia:** Jardín, Ventanas, 20 km de Jardín hacia Riosucio, Caldas, 2880 m, 25 Abr 1987 (fl), *L. Albert et al. 7560* (COL, HUA, NY); Jardín, Ventanas, 20 km de Jardín hacia Riosucio, Caldas, 2880 m, 25 Abr 1987 (fl), *L. Albert et al.* 7561 (COL, HUA); Jardín, Alto de Ventanas, 15 km SO de Jardín en la vía a Riosucio, 5°30' North, 75°50' West, 2400-2800 m, 9 Jun 1987 (fl, fr), *R. Callejas et al. 3945* (HUA); Jardín, vereda Ventanas, 2.5 km SSE of Ventanas to Summit along Jardín-Riosucio, ca. 5°40' North, 75°47' West, 2700-2900 m, 30-31 Oct 1987 (fl), *J. L. Luteyn & O. Marulanda 11804* (HUA); Jardín, carretera Jardín (Antioquia) – Riosucio (Caldas), sitio Ventanas, cerca de la torre repetidora de televisión, 2900 m, 18 Abr 1987 (fl, fr), *O. Marulanda & H. Jaramillo 263* (HUA); Jardín, carretera Jardín (Antioquia) – Riosucio (Caldas), sitio Ventanas, cerca de la torre repetidora de televisión, 2900 m, 18 Abr 1987 (fl, fr), *O. Marulanda & H. Jaramillo 279* (HUA); Jardín, vereda La Herrera, finca El Imperio, 2900 m, 1 Jul 2002 (fl, fr), *A. Rivas & A. Ruiz 638* (HUA); Jardín, km 20 of road Jardín-Riosucio (Dpto. Caldas), ca 15 km SSE of Jardín, alto de Ventanas, 5°31' North, 75°48' West, 2700-2790 m, 29 Oct 1988 (fl), *J. L. Zarucchi et al. 6920* (COL, HUA).

Burmeistera nigropilosa J. L. Luteyn **ex** Garzón & F. González, **sp. nov.** TYPE: COLOMBIA. **Antioquia**: Frontino, corregimiento Nutibara, región de Murrí, Alto de Cuevas, ca. 6°45' North, 75°20' West, 1500-1880 m, 16-18 Oct 1987 (fl, fr), *J. L. Luteyn, S. Sylva, A. Brant & G. Martínez 11700* (holotype: HUA; isotypes: COL, NY). (Fig. 1D-I)

Table 2. Comparative traits of *Burmeistera fuchsioides* and three closely related species.

Traits	*B. fuchsioides,* sp. nov.	*B. andersonii* Jeppesen	*B. formosa* (E. Wimm.) Jeppesen	*B. rubrosepala* (E. Wimm.) E. Wimm.
Indument of lower surface of leaf blade	pubescent	glabrous	pubescent	glabrous
Number of secondary veins	eight to ten	eight to nine	nine to eleven	twelve
Flower arrangement	sparsely arranged	congested forming corymbiform distal portions	sparsely arranged	sparsely arranged
Peduncle	bracteate	bracteate	bracteate	ebracteate
Length of hypanthium	6-9 mm	8-10 mm	ca. 6 mm	ca. 3 mm
Shape and length of calyx lobes	liguliform, (3-) 5-9 mm	semicircular, ca. 2 mm	triangular, ca. 2 mm	ovate, oblong-ovate, ca. 5 mm
Color of the corolla	dark pink to red	green with reddish-violet spots	green	maroon
Length of the corolla tube	1.5-1.9 cm	ca. 1.2 cm	2.3-2.5 cm	ca. 9 mm
Length of dorsal/ lateral/ ventral corolla lobes	8-11/ 4-6/ 4-5 mm	13-15/ 8-10/ 8-10 mm	ca. 10/ 6-7/ 6-7 mm	ca. 8/ ca. 4/ ca. 4 mm
Length of androecial portion exserted	0.8-1 (-1.4) cm	0.5-0.7 cm	ca. 0.5 cm	ca. 2.8 cm
Ventral anthers	barbate	not barbate	barbate	not barbate
Geographic range	Jardín (Antioquia) and Riosucio (Caldas), eastern slopes of the Western Cordillera (Colombia), between 2400-2900 m.	Napo Province (Ecuador), ca. 2400 m.	Department of Cauca (Colombia), ca. 2500 m. In Ecuador, the precise location is unknown.	Province of Pichincha, Quito and Mojanda, (Ecuador), between 2600 and 2800 m.

Terrestrial herbs or shrubs to 1 m high, erect, occasionally slightly scandent, with abundant white latex, densely covered of dark or hyaline indument. Stems fleshy, terete, green, often suffused with purple, slightly branched, covered with dense dark or hyaline pubescence; internodes (2-)3-6(-7) cm long. Leaves spirally arranged; petiole (0.5-)1-2 cm long, green, occasionally suffused with purple, densely pubescent; blades proximal and distal of the same shape, the distal slightly smaller, ovate to ovate-elliptic, (7-)8-14(-18) x (4-)5-7(-8) cm, bullate and slightly fleshy, the base slightly asymmetric, cuneate, the apex acute to acuminate, the margins subentire to slightly serrulate, with 20-40 teeth on each side, teeth of two-size classes, each tooth with a distal callosity, the adaxial surface green, sparsely pubescent, the abaxial surface pale green, densely pubescent with dark or hyaline trichomes, the venation semicraspedodromous, with nine to eleven pairs of secondary veins, irregularly spaced, excurrent to mid-vein, higher order veins reticulated, submarginal vein absent. Flowers solitary in the axils of upper leaves; peduncle green, densely pubescent, (3-)4-6 cm long at anthesis, with two filiform bracts, 4-6 mm long each; hypanthium subglobose, 5-7 mm long, 5-6 mm in diameter, densely pubescent; calyx lobes lanceolate, (11-)13-16 x 1-3 mm, patent, with the margin subentire, sinus between the lobes of 1-2 mm width; corolla straight at anthesis, (2.1)2.4-2.6(-2.8) cm long, green-yellow outside, white-green inside, sparsely pubescent with dark or hyaline trichomes, tube slightly swollen basally and distally, 1.1-1.5 cm long, 3-4 mm in diameter at its mid-level, lobes unequal, triangular-falcate, forming an obtuse angle with respect to the tube, the apex acute, the dorsal lobes 10-11 x 3-4 mm, the lateral lobes 5-7 x 2-4 mm, the ventral lobe 4-5 x 4 mm; androecium exserted by 5-6 mm between the dorsal lobes, the filament tube erect, 1.8-2.1 cm long, glabrous, the anther tube curved-cylindrical, to 3 mm in diameter, puberulous, the dorsal anthers to 5 mm long, the ventral anthers to 3 mm long, sparsely pubescent with an apical tuft of white woolly trichomes to 2 mm long; stigma bilobed. Berries globose, 0.7-1 cm in diameter (*in siccus*), fleshy, patent, green, densely pubescent, calyx lobes persistent, lanceolate, to 1.5 x 0.4-0.6 cm; seeds ovoid, to 0.8 x 0.2 mm.

Etymology: We have kept the unpublished name annotated by J. L. Luteyn in the specimen *D. Sánchez 1399* (COL, MEDEL, NY) in 1987. The specific epithet refers to the black color of the trichomes, but it should be noted that some specimens have also brown or hyaline pubescence.

Distribution, ecology and phenology: *Burmeistera nigropilosa* is known from the type locality in the municipalities of Frontino and Urrao (NW Antioquia), including localities in the National Natural Park "Las Orquídeas". The species has also been collected in areas between the departments of Valle del Cauca and Chocó (Serranía de Los Paraguas). It grows in the understory stratum of cloud, low montane forests (bp-MB following Espinal, 2011), between 1450-2570, with an isolated record at 800 msnm, in the western slopes of the Western Cordillera. Flowering and fruiting specimens were collected throughout the year, except in March and June.

Taxonomic notes: *Burmeistera nigropilosa* belongs to sect. *Barbatae* (sensu Wimmer, 1932, 1943). It is distinguished from other species by the dense pubescence translucent to black, the bullate, ovate to ovate-elliptic leaves, the long calyx lobes (11-) 13-16 mm, and the presence of two filiform bracts, sometimes caducous. It is closely related to *B. bullatifolia* Garzón & F.González, and *B. variabilis* (Gleason) E. Wimm., both densely pubescent and with bracteate peduncle. In Table 3, we compare these three species.

Table 3. Comparative traits of *Burmeistera nigropilosa* and two closely related species.

Traits	*B. nigropilosa,* sp. nov.	*B. bullatifolia* Garzón & F. González	*B. variabilis* (Gleason) E. Wimm. = *B. gravida* (Gleason) E. Wimm.
Surface of leaf blade	bullate	bullate	not bullate
Shape of leaf blade	ovate to ovate-elliptic	elliptic to narrowly elliptic	broadly elliptic
Size of leaf blade	(7-) 8-14 (-18) x (4-) 5-7 (-8) cm	3-13 × 2.0-6.3 cm	ca. 18 x 9 cm
Length of hypanthium	5-7 mm	5-6 mm	ca. 9 mm
Shape and length of calyx lobes	lanceolate, (11-) 13-16 x 1-3 mm	narrowly oblong, 6–10 mm	triangular, ca. 6 mm
Length of the corolla tube	1.1-1.5 cm	0.9–1.3 cm	ca. 2.5 cm
Length of androecial portion exserted	0.5-0.6 cm	ca. 0.6 cm	ca. 1.3 cm
Consistency and shape of the fruit	fleshy, globose	inflated, pyriform	fleshy, globose
Geographic range	Frontino and Urrao (NW Antioquia), and in areas between the departments of Valle del Cauca and Chocó (Colombia), between 1450 and 2570 m.	N Valle del Cauca, SW Antioquia, and S Chocó, western slopes of the Colombian Western Cordillera, between 1400 and 2800 m.	Western and eastern slopes of the Colombian Western Cordillera, in the departments of Antioquia, Córdoba, Risaralda and Valle del Cauca, between 1500 and 2200 m.

Additional specimens examined: COLOMBIA. **Antioquia:** Urrao, corregimiento de Encarnación, Parque Nacional Natural Las Orquídeas, sector Calles, camino hacia La Virgen, 14 Abr 2011 (fl, fr), *J. Betancur et al. 15214* (COL, JAUM); Frontino, road to Murrí, 15 km W of Nutibara, Alto de Cuevas, ca. 1 km S of road, 06°45’ North, 76°23’ West, 1850 m, 17 Oct 1987 (fl, fr), *A. Brant & G. Martínez 1341* (COL); Frontino, Parque Nacional Natural Las Orquídeas, camino de la finca Guaduala al alto de Carauta, 6°30’ North, 76°30’ West, 1750 m, 2 Dic 1986 (fl, fr), *R. Callejas et al. 3005* (HUA, NY); Frontino, corregimiento de Nutibara-La Blanquita, Alto de Cuevas, finca el Palmar, 6°40’ North, 76°24’ West, 1970-2080 m, 13 Feb 1991 (fl, fr), *R. Callejas et al. 9857* (HUA); Parque Nacional Natural Las Orquídeas, sector Venados, 6°33’ North, 76°19’ West, 800 m, 3 Abr 1988 (fl, fr), *A. Cogollo et al. 3016* (JAUM); Frontino, corregimiento de Nutibara, vereda Alto de Cuevas, quebrada del Oso, 1900-2000 m, 23 Abr 1991 (fl, fr), *R. Fonnegra et al. 3529* (HUA); Frontino, corregimiento Nutibara, Nutibara-La Blanquita road, region of Murrí, Alto de Cuevas, 6°45’ North, 75°20’ West, 1700-1800 m, 19 Apr 1988 (fl, fr), *J. L. Luteyn et al. 12071* (HUA, NY); Frontino, corregimiento Nutibara, Nutibara-La Blanquita road, region of Murrí, Alto de Cuevas, 6°45’ North, 72°20’ West, 1700-1800, 19 Apr 1988 (fl), *J. L. Luteyn et al. 11992* (MEDEL, NY); Frontino, corregimiento Nutibara, Nutibara-La Blanquita road, region of Murrí, Alto de Cuevas, ca. 9-18 km W of Nutibara, 6°45’ North, 72°20’ West, 1450-2130, 6-10 Abr 1989 (fl,fr), *J. L. Luteyn et al. 12469* (NY); Urrao, road between Urrao and Caicedo, 18 km NE of Urrao, 6°23’ North, 76°03’ West, 2570 m, 27 Feb 1989 (fl), *J. M. MacDougal et al. 4280* (HUA); Urrao, corregimiento La Encarnación, vereda Calles, Parque Nacional Natural Las Orquídeas, camino Calles-La Encarnación, después de la confluencia del río Polo y el río Calle y antes del río San Pedro, sitio La Quiebra, 6°30’31” North, 76°30’31” West, 1600-1850, 31 Ene–2 Feb 2011 (fl, fr), *P. Pedraza-Peñaloza et al. 2176* (COL, NY); Frontino, corregimiento Nutibara, cuenca alta del Río Cuevas, finca de Tulio Álvarez, 2000 m, 14 Jul 1987 (fl, fr), *D. Sánchez et al. 1399* (COL, MEDEL, NY); Frontino, corregimiento Nutibara, cuenca alta del Río Cuevas, finca de Emilio Osorio, 1780 m, 23 Sep 1987 (fl, fr), *D. Sánchez et al. 1564* (COL, MEDEL); Frontino, km 17 of road Nutibara-La Blanquita, region of Murrí, 06°45’ North, 76°24’ West, 1869 m, 3 Nov

1988 (fl), *J. L. Zarucchi et al. 1988* (COL). **Chocó:** Carretera Ansermanuevo-San José del Palmar, límite con el Valle del Cauca, Alto Galápago, 2100 m, 27 Ago 1976 (fl), *E. Forero et al. 2180* (COL). **Valle del Cauca:** El Cairo, corregimiento Boquerón, vereda Las Amarillas, Serranía de Los Paraguas, Cerro El Inglés, ca. 4°45' North, 76°20' West, 2000-2200 m, 14 May 1988 (fl), *J. L. Luteyn et al. 12319* (CUVC).

Burmeistera orientalis Garzón & F. González, **sp. nov.** TYPE: COLOMBIA. **Santander**: Límites entre los departamentos de Santander y Boyacá, corregimiento de Virolín, finca "La Sierra", 2500-2600 m, 12 May 1976 (fl, fr), *G. Lozano, J. H. Torres, S. Díaz-Piedrahíta 2390* (holotype: COL). (Fig. 2)

Terrestrial herbs or shrubs to 2 m high, erect, with white latex, sparsely pubescent with maroon trichomes. Stems fleshy, terete, green, often suffused with purple, slightly branched, covered with sparsely brown pubescence; internodes 1-3.5 cm long. Leaves spirally arranged; petiole 1-5(-8) mm long, green; proximal and distal blades of the same shape and size, obovate, 4-9(-10.5) x 2-4.8 cm, fleshy to slightly coriaceous, the base symmetric, cuneate, the apex convex to rounded, the margin revolute, subentire to slightly serrulate, with 8-14 teeth on each side, teeth in one-size class, each tooth with a distal callosity, the adaxial surface lustrous green, glabrous, the abaxial surface pale green, sparsely pubescent, the venation brochidodromous, with five to seven pairs of secondary veins, irregular spaced, excurrent to mid-vein, higher order veins reticulated, submarginal vein present but irregular. Flowers solitary in the axils of upper leaves; peduncles green suffused with maroon, sparsely pubescent, 5-6 cm long at anthesis, with two filiform bracts, 2-3 x ca. 0.5 mm each; hypanthium cupuliform, 6-8 mm long, 5-7 mm in diameter, sparsely pubescent; calyx lobes lanceolate, patent, 5-8 x 2-3 mm, with the margins subentire, pale green with the margins suffused with maroon, sinus between the lobes 1-1.5 mm wide; corolla straight at anthesis, 2.5-3.5 cm long, pale green-yellow, occasionally suffused with maroon, glabrous to sparsely pubescent, tube slightly swollen basally and distally, 1.8-2.4 cm long, 3-4 mm in diameter at its mid-level, lobes unequal, triangular-falcate, forming an obtuse angle with respect to the tube, the apex acute, the dorsal lobes 10-12 x 3-5 mm, the lateral lobes 5-7 x 4-5 mm, the ventral lobe 6-7 x 5 mm; androecium exserted by ca. 1.5 cm between the dorsal lobes, the filament tube erect, 2.8-3.5 cm long, glabrous, the anther tube curved-cylindrical, 4-5 mm in diameter, densely woolly, white, the dorsal and lateral anthers 7-8 mm long, the ventral anthers 4-5 mm long, with an apical tuft of white woolly trichomes to 3 mm long; stigma bilobed. Berries globose, fleshy, suberect, 1-1.5 cm in diameter (*in siccus*), green suffused with maroon, sparsely pubescent, calyx lobes persistent, lanceolate, to 0.7-1.2 x 0.2-0.3 cm; seeds ovoid, to 1 x 0.2 mm.

Etymology: The name refers to the Cordillera Oriental of Colombia, as all known localities of this new species are in this Cordillera. Out of the approximately 60 Colombian species of *Burmeistera*, only *B. asclepiadea* Gleason, *B. succulenta* H. Karst., *B. glabrata* (Kunth) Benth. & Hook. f. ex B. D. Jacks., *B. puberula* E. Wimm., and *B. venezuelensis* Lammers, and this species grow in the Cordillera Oriental.

Distribution, ecology and phenology: *Burmeistera orientalis* has been collected only in the type location, in a narrow area S of the Department of Santander. It grows in the understory stratum of montane wet forests between 1980-2600 m of elevation. Flowering and fruiting specimens were collected in May and November.

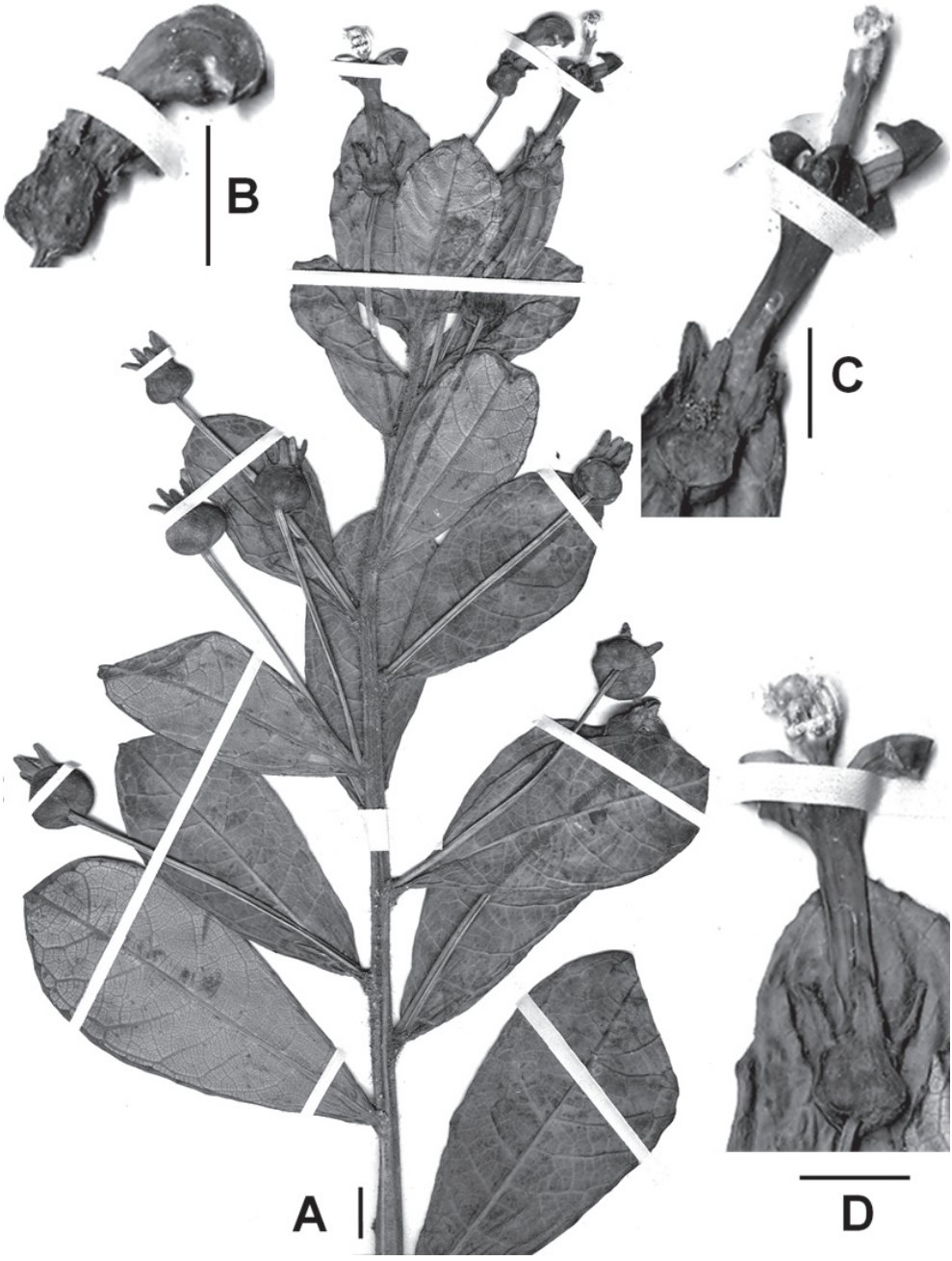

Figure 2. ***Burmeistera orientalis*** Garzón & F. González, holotype. **A**. Branch with flowers and fruits. **B**. Floral bud, lateral view. **C, D**. Flowers at anthesis, ventral view. Scale bars: 1 cm.

Taxonomic notes: *Burmeistera orientalis* belongs to sect. *Barbatae* (sensu Wimmer, 1932, 1943). It is distinguishable from its congeners by the obovate leaves with few secondary veins (five to seven), the presence of two bracts on the peduncle, and the long corolla tube (1.8-2.4 cm). In Table 4 we compare the new species with *B. formosa* E. Wimm., a species from sect. *Barbatae* that also has pubescent leaf surface, bracteate peduncle and long corolla tubes.

Additional specimens examined: COLOMBIA. **Santander:** Vía Virolín, 2000 m, 14 Nov 1996 (fl, fr), *Y. López et al. 96-30* (COL); Charalá, vereda El Volcán, 2180 m, 8 May 1986 (fl, fr), *L. D. Moreno & A. V. Méndez 93* (COL); Charalá, vereda El Palmar, 1980 m, 13 Nov 1981 (fl, fr), *C. Caro et al. 107* (COL).

Burmeistera serraniaguae Garzón & F. González, **sp. nov.** TYPE: COLOMBIA. **Chocó**: San José del Palmar, Reserva Galápagos, 2200-2500 m, 31 May 2008 (fl, fr), *J. Garzón-Venegas, D. Canal, N. Castaño, F. García & H. Mendoza 485* (holotype: COL; isotypes: CUVC, HUA, NY). (Fig. 3A-D)

Terrestrial, unbranched herbs or shrubs to 1 m high, erect, occasionally scandent or epiphytic, with abundant white latex, glabrous. Stem fleshy, terete, green, often suffused with maroon, glabrous; internodes 2.5-4(-6.5) cm long. Leaves distichous; petiole 0.7-1.5 cm long, green to maroon, glabrous; proximal and distal blades of the same shape and size, ovate to ovate-elliptic, 5-8(-14) x 2-4 cm, fleshy, the base often slightly asymmetric, cuneate, the apex acute to acuminate, acumen to 1.5 cm long, the margins slightly serrulate, with 10-15 one-size class teeth on each side, each tooth with a distal callosity, the adaxial surface bright green suffused with maroon, glabrous, the abaxial surface green suffused with maroon or totally maroon, glabrous, the venation semicraspedodromous, with (6-)9 to twelve pairs of secondary veins, irregular spaced, excurrent to mid-vein, higher order veins slightly reticulated, submarginal vein absent. Flowers solitary in the axils of upper leaves; peduncle green suffused with maroon, glabrous, (4-)6.5-8 cm long at anthesis, ebracteate; hypanthium obconic, 5-7 mm long, 4-5 mm in diameter, glabrous; calyx lobes lanceolate, 13-16(-20) x 1-2 mm, erect, with the margins entire to slightly serrulate with two or three teeth on each side; corolla straight at anthesis, glabrous, pale pink to maroon, 2-2.8 cm long, tube cylindrical, slightly inflated at the base, 1.1-1.6 cm long, 2-3 mm in diameter, lobes unequal, narrowly triangular-falcate, forming an obtuse angle with respect to the tube apex, the apex acute, the dorsal lobes 11-16 x 2-4 mm, the lateral lobes 7-9 x 4-6 mm, the ventral lobe 6-8 x 1.5-2.5 mm; androecium exserted by 1.5-2 cm between the dorsal lobes, the filament tube erect, 2.7-3.5 cm long, sparsely pubescent, the anther tube obliquely cup-shaped, 4-6 mm in diameter,

Table 4. Comparative traits of *Burmeistera orientalis* and *B. formosa*.

Traits	*B. orientalis,* sp. nov.	*B. formosa* (E. Wimm.) Jeppesen
Length of petiole	1-5 (-8) mm	ca. 10 mm
Shape of leaf blade	obovate	ovate
Number of secondary veins	five to seven pairs	nine to eleven
Length of peduncle	5-6 cm	6-8 cm
Shape and length of calyx lobes	lanceolate, 5-8 mm	triangular, 2 mm
Length of androecial portion exserted	ca. 1.5 cm	ca. 0.5 cm
Consistency of the fruit	fleshy	inflated
Geographical range	S of the department of Santander (Colombia), between 1980 and 2600 m.	Department of Cauca (Colombia), and Ecuador (the specific location in Ecuador is unknown), at about 2500 m.

puberulous, the dorsal and lateral anthers 6-8 mm long, the ventral anthers to 4-6 mm long, sparsely pubescent, not barbate; stigma bilobed. Berries pyriform, 1-2.5 cm long, to 1.4 cm in diameter (*in siccus*), fleshy, erect, pink, glabrous, calyx lobes persistent, lanceolate; seeds ovoid, to 1.2 x 0.15 mm.

Etymology: This species is named after the "Corporación Serraniagua", an environmental organization devoted to the study, conservation and protection of the "Serranía de Los Paraguas" and its area of influence at the western slopes of the Western Cordillera (municipalities of El Cairo, Valle, and San José del Palmar, Chocó). The new species is native to that area, along with three additional species recently described (*Burmeistera bullatifolia* Garzón & F.González [in press], *B. nigropilosa* [this publ.], and *B. salicifolia* Garzón, J. L. Luteyn & F. González [in press]).

Distribution, ecology and phenology: *Burmeistera serraniaguae* is known from the type locality in southeastern Chocó, as well as in northern Valle del Cauca, southwestern Risaralda, and northern Cauca. It grows in the western slopes of the Western Cordillera, between 1200–2500 m, on the understory stratum of cloud forest remnants, in moist soils. Flowering and fruiting specimens have

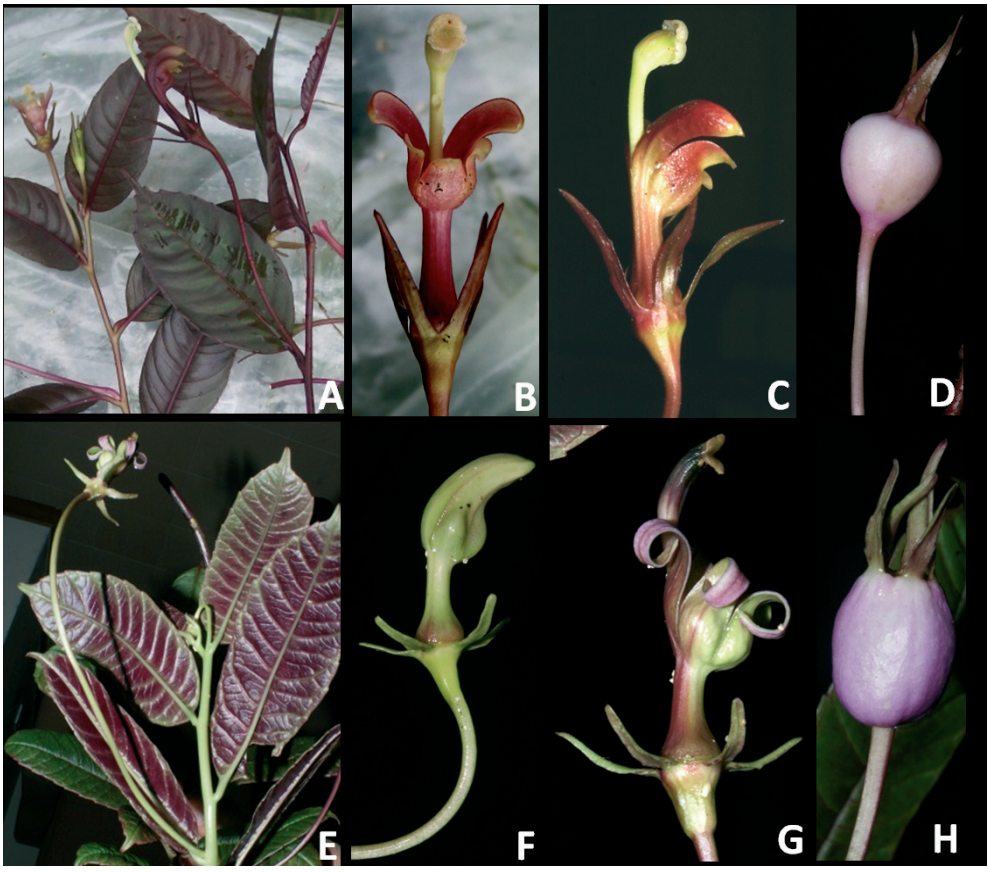

Figure 3. **A-D**. ***Burmeistera serraniaguae*** Garzón & F. González (holotype, *Garzón et al. 485*; photo H. Mendoza). **A**. Flowering branches. **B-C**. Flowers in full anthesis, ventral (**B**) and side (**C**) views. **D**. Berry. **E-H**. ***B. succulenta*** H. Karst. & Triana (*Garzón 491*). **E**. Flowering branches. **F-G**. Preanthetic (**F**) and anthetic (**G**) flowers, side views. **H**. Berry.

been collected throughout the year, except in June and December.

Taxonomic notes: *Burmeistera serraniaguae* belongs to sect. *Imberbes* (sensu Wimmer, 1932, 1943). It differs from other species by the absence of indument, the pink color of the vegetative parts as well as the flowers and the berries, and the shape, length and position of the calyx lobes (Fig. 3A-D). Several specimens of this new species were misidentified as belonging to *B. succulenta* H. Karst. & Triana (e. g. *Luteyn 7322*) due to some superficial similarities (Fig. 3E-H). In the Table 5 we summarize the differences between these two species, as well as two other species of section *Imberbes*, *B. smaragdi* Lammers and *B. truncata* Zahlbr.

Additional specimens examined: COLOMBIA. **Cauca**: Parque Nacional Natural Munchique, bajada al refugio de La Gallera desde el km 81, 1700 m, 19 Jul 1993 (fl, fr), *G. Lozano et al. 6497* (COL). **Chocó**: San José del Palmar, 5-9 km de la carretera San José del Palmar a El Cairo, subiendo por el alto de Galápago, 4°50'-4°52' North, 76°13' West, 1500-1760 m, 2 Ene 2007 (fl, fr), *J. Betancur et al. 12779* (COL); San José del Palmar, vereda Corcovados, finca Ayaconas, 2100 m, 20 Ene 1983 (fl), *S. Díaz-Piedrahíta 3770* (COL); carretera Ansermanuevo-San José del Palmar, límite con el Valle del Cauca, alto del Galápago, 2100 m, 28 Ago 1976 (fl, fr), *E. Forero et al. 2246* (COL); carretera Ansermanuevo-San José del Palmar, límite con el Valle del Cauca, alto del Galápago, 2000 m, 18 Feb 1977 (fl), *E. Forero et al. 2875* (COL); San José del Palmar, reserva Galápagos, 2200-2500 m, 31 May 2008 (fl, fr), *J. Garzón-Venegas et al. 493* (COL); carretera Cartago-San José del Palmar, km 65, 1900-2000 m, 15 Nov 1978 (fl), *G. Lozano & J. Díaz 3073* (COL); km 55 de la carretera Ansermanuevo-San José del Palmar, 1950-1700 m, 19 Mar 1980 (fl, fr), *G. Lozano & J. Díaz 3230* (COL); San José del Palmar, vía al alto Galápagos, 1600-1750 m, 12 Nov 1985 (fl, fr), *G. Lozano et al. 4946* (COL); Ansermanuevo-San José del Palmar road, 2-5 km of San José del Palmar, 1200-1500 m, 20 Abr 1979 (fl, fr), *J. L. Luteyn et al. 7322* (COL, NY); Ansermanuevo-San José del Palmar road, from Chocó- Valle border west, 10 km towards San José del Palmar, 4°40' North, 76°25' West, 1524-2050 m, 15 May 1984 (fl, fr), *J. L. Luteyn et al. 10545* (COL, JAUM, NY); San José del Palmar, cerro del Torrá, abajo del helipuerto, vertiente occidental, vereda Río Negro, 1600 m, 18 Ago 1988 (fl), *J. E. Ramos & P. A. Silverstone 1317* (CUVC, NY); Ansermanuevo-San José del Palmar road, 54 to 64 km W of Ansermanuevo, ca. 4°12' North, 76°12' West, 1900 m, 25 Ene 1986 (fl, fr), *B. A. Stein & L. McDade 3294* (COL). **Risaralda**: Pueblo Rico, vereda Montebello, cerro Montezuma, carretera que conduce de Montebello a la torre de repetición, vertiente pacífica de la Cordillera Occidental, 5°15' North, 76°06' West, 2100-2450 m, 29 Sep-2 Oct 2006 (fl), *J. Betancur et al. 12380* (COL). **Valle del Cauca:** El Cairo, corregimiento Boquerón, vereda Las Amarillas, Serranía de Los Paraguas, ca. 21-25 km beyond El Cairo, ca. 4°45' North, 76°20'West, 1850-2000 m, 25 Abr 1989 (fl, fr), *J. L. Luteyn & J. Giraldo 12676* (CUVC, NY).

New records of *Burmeistera* in Colombia. Along with the newly described species, we report the presence of the following three species in Colombia: (1) *B. formosa* (Table 4), previously reported only from Ecuador (Jeppesen, 1981), has been collected in the department of Cauca, El Tambo, Parque Nacional Munchique, vereda La Romelia, entre la quebrada Charco Azul y la quebrada El Tigrillo, 2500 m, 21 Jul 1993 (fl, fr), *C. Barbosa et al. 8644* (COL); (2) *B. smaragdi* (Table 5), previously reported only from Ecuador (Lammers, 2002), has been collected in the department of Nariño, mun. Ricaurte, Reserva Natural "La Planada", 1800 m, Nov 1993 (fl), *M. Amaya 313* (COL); and (3) *B. venezuelensis*, previously reported only from Venezuela (Lammers, 1998), has

been collected in the department of Norte de Santander, Parque Nacional Natural Tamá, 2800 m, 1 Feb 2012 (fl,fr), *H. Mendoza et al. 17709* (COL).

Guidelines to collect *Burmeistera*. After careful literature revision and extensive field and herbarium work for the ongoing monograph of *Burmeistera* in Colombia, we have found that a number of field observations become critical for identification and species recognition. The frequent lack of these data in herbarium sheets prompted us to strongly recommend collectors to take careful note and/or photograph of the following traits directly in the field: (a) life form, either terrestrial, epiphytic or hemiepiphytic; (b) consistency of the leaves; (c) full variation of leaf size in an individual, either by taking photographs or by collecting basal, mid-level, and distal leaves; (d) presence of one or two small club-like or filiform bracts, which are sometimes deciduous and can be lost during drying; (e) position of the calyx lobes *in vivo*, which can be revolute, patent (e.g. Figs. 1 D-I; 3 E-G), or erect (e.g. Fig. 3 A-C); (f) color of the inner surface of the corolla, as in some species the corolla is bicolor; (g) degree of curvature of the corolla lobes, which can be straight, falcate (e.g. Fig. 1 A, G-I; 3 A-C), involute (Fig. 1 B-C) or curled (e.g. Fig. 3 G); (h) length of the exserted portion of the androecial tube (cf.

Table 5. Comparative traits of *Burmeistera serraniaguae* and three closely related species.

Traits	*B. serraniaguae,* sp. nov.	*B. succulenta* H. Karst. & Triana	*B. smaragdi* Lammers	*B. truncata* Zahlbr.
Indument	glabrous	glabrous	sparsely pubescent	glabrous
Length of petiole	0.7-1.5 cm	0.5-1 (1.4) cm	0.3-0.7 cm	0.8-1.5 cm
Consistency of blade	membranaceous, not bullate	membranaceous, bullate	membranaceous, not bullate	membranaceous, not bullate
Shape of leaf blade	ovate to ovate-elliptic	oblong to elliptic	narrowly elliptic to oblong	oblong-ovate
Apex of the leaves	acute to acuminate, gradually narrowed	acuminate to cuspidate, abruptly narrowed	caudate	acute to acuminate, gradually narrowed
Margin of leaf blade	slightly serrulate	somewhat sinuous, slightly serrulate	slightly serrulate	slightly serrulate
Number of secondary veins	(six-) nine to twelve	nine to eleven	nine to eleven	twelve to thirteen
Length of peduncle	(4-) 6.5-8 cm	9-16 cm	3.7-6.6 cm	5-6 cm
Length of hypanthium	5-7 mm	8-14 mm	6-11 mm	7-8 mm long
Position of calyx lobes (*in vivo*)	erect	patent	erect	erect
Shape and length of calyx lobes	lanceolate, 13-16(-20) mm	linear, 10-14 mm	narrowly triangular or linear triangular 12-19 mm	linear-triangular 8-15 mm
Color of corolla	pale pink to maroon	green to maroon	green to cream	green
Length of the corolla tube	1.1-1.6 cm	1.4-2 cm	1.15-1.3 cm	0.7-0.8 cm
Corolla lobes	curved	strongly retrorse	curved	curved
Androecium exserted length	1.5-2 cm	to 2.4 cm	unknown	2.4 cm
Indument of ventral anthers	not barbate	not barbate	not barbate	not barbate
Shape of fruit	pyriform	globose, ellipsoid	unknown	ovoid
Color of mature berry	pink	pink	unknown	unknown
Geographical range	Western slopes of the Colombian Western Cordillera, in S Chocó, N Valle del Cauca, SW Risaralda, and N Cauca, between 1200–2500 m..	Widely distributed (Costa Rica, Colombia, Venezuela, Ecuador and Peru). In Colombia, it grows along the two flanks of the Western and Central cordilleras, in the departments of Antioquia, Caldas, Chocó, Quindío, Risaralda and Valle del Cauca, between 1200 and 2670 m.	Ricaurte, Nature Reserve "La Planada", Nariño (Colombia), and Esmeralda province (Ecuador), between 400 and 1800 m..	Western slopes of the province of Pichincha (Ecuador), between 1500 and 2500 m.

Fig. 1 B-C *versus* Fig. 3 B-C); (i) position of the berry *in vivo*; (h) consistency of the berry, especially if it is inflated or not.

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